

Appendix D

Present Worth Analysis of Retained Alternatives

CDM Camp Dresser & McKee Inc.
Preliminary Opinion of Probable Cost

Project: Gilt Edge Mine
Project #: 4000-30291
Location: Lawrence County, South Dakota

Updated: 7-Sep-01
Estimator: BCD
Project Status: Final ARD WTP FFS (-30% to +50%)

Table D-1. Comparison of Present Worth Costs for Metal Hydroxide Precipitation

Q (gpm)	<u>NaOH Precipitation</u>				
	Capital Cost (\$)	Annual O&M Cost (\$)	Present Worth Cost - 90% (mil \$)	Present Worth Cost - 95% (\$)	Present Worth Cost - 99% (\$)
250	1,364,000	3,787,000	13.87	--	--
300	1,690,000	4,030,000	6.20	9.79	--
400	2,261,000	4,533,000	5.92	8.02	--
500	2,462,000	5,020,000	6.12	6.52	16.73
600	3,183,000	5,523,000	5.89	6.77	7.65
700	3,808,000	6,009,000	6.75	6.75	8.19
800	4,313,000	6,512,000	6.98	6.98	9.06
	<u>CaO Addition</u>				
250	2,054,000	2,938,000	11.76	--	--
300	2,496,000	3,001,000	5.85	8.53	--
400	3,078,000	3,139,000	5.61	7.07	--
500	3,277,000	3,258,000	5.65	5.91	12.54
600	4,352,000	3,396,000	6.02	6.29	7.10
700	4,954,000	3,519,000	6.68	6.68	7.52
800	5,412,000	3,656,000	6.91	6.91	8.08

Table D-2. Probabilistic Analysis for De-Watering Storage

Q (gpm)	Probability of less than # of years to de-water storage		
	90	95	99
250	3.7	--	--
300	1.1	2.1	--
400	0.8	1.3	--
500	0.7	0.8	3.1
600	0.5	0.6	0.8
700	0.5	0.5	0.7
800	0.4	0.4	0.7

"-" denotes a period >5 years to treat the present storage volume on-site (approximately 110 million gallons)

Table D-3. Probability of Untreated Release During a Year

Q (gpm)	Untreated Release	No Untreated Release
0	100%	0%
100	100%	0%
200	21%	79%
250	13%	87%
300	8%	92%
400	5%	95%
500	3%	97%
600	0.5%	100%
700	0.5%	100%
800	0.0%	100%

Table D-4. Summary of Alternative Treatment Scenarios at 300 gpm

Alternative	Capital Cost	Annual O&M Cost	\$/1000 gal	Present Worth Cost ⁽¹⁾⁽²⁾
Alternative 1 - No Action	\$ -	\$ 194,000	n/a	\$ 476,000
Alternative 3a - Divert ARD Flow from Hoodoo Gulch to Sunday Pit and Install ARD Diversion Ditch At Pond C	\$ 262,000	\$ 1,900	n/a	\$ 266,000
Alternative 3b - Divert ARD Flow from Hoodoo Gulch to Strawberry Pond and Install ARD Diversion Ditch At Pond C	\$ 307,000	\$ 1,900	n/a	\$ 311,000
Alternative 6a - Upgrade Existing Caustic Chemical Precipitation ARD WTP With Additional Treatment Train and Filtration (ARAR waiver)	\$ 1,690,000	\$ 4,030,000	\$25.56	\$ 9,789,000
Alternative 6b - Convert Existing Caustic Chemical Precipitation ARD WTP to Lime Precipitation and upgrade With Additional Treatment Train and Filtration (ARAR waiver)	\$ 2,496,000	\$ 3,001,000	\$19.03	\$ 8,527,000
Alternative 6c - Construct New Proprietary Microencapsulation/Precipitation ARD WTP (ARAR Waiver)	\$ 1,985,000	\$ 3,332,000	\$21.13	\$ 8,681,000
Alternative 6d - Construct New Optimized Chemical Precipitation ARD WTP Using Proprietary Metals Coordination Process and Microfiltration (ARAR Waiver)	\$ 2,475,000	\$ 2,846,000	\$18.05	\$ 8,195,000

Notes:

- (1) Present Worth analysis assumes annual O&M costs over period of time (years) required to de-water the site's water storage at a certain flow rate (250 gpm to 800 gpm):
- | | |
|---|-----|
| Probability of de-watering the site (90, 95 or 99%) = | 95 |
| Treatment Capacity (gpm, increments of 100) = | 300 |
| Years required to de-water site (90%) = | 1.1 |
| Years required to de-water site (95%) = | 2.1 |
| Years required to de-water site (99%) = | -- |
- (2) Present Worth analysis for Alternative 1 assumes annual O&M costs and periodic costs for an assumed 5-year interim period.

General Notes

- 1 PW - previous work; VQ - vendor quote (adjusted for labor and equipment as a percentage of material costs):
percentage estimated based upon equipment installation: 25%
- 2 Sludge materials will be disposed of on-site; costs incurred for loader, truck, and operators included as Item 2.3.
- 3 Existing WTP is capable of treating 300 gpm with additional capital cost accounted for by this analysis.
- 4 Annual O&M costs are estimated using labor rates and breakdown of ODC/IDC based on previous work.
- 5 Electrical utility costs currently are \$0.0437/kWhr [Rolland (BOR), 2001]. FFS costs based on hours of operation and adjusted by 50 percent to \$0.0655/kWhr.
- 6 Capital costs for the following items are estimated as a percentage of total Process/Mechanical costs:

Electrical 12%

Instrumentation and Controls 15%

- 7 Annual O&M costs also include snow removal equipment (Items 2.5.2.1 and 2.5.2.2) and labor (Item 2.3).
- 8 Valves and appurtenances are estimated as a percentage of the total piping costs: 60%
- 9 HDPE pipe will be used for buried pipes; costs are estimated based on excavation, bedding, and backfill/compaction.
- 10 Construction Prorates:

General Conditions (Overhead) ^(a)	20%	
Contractor's Profit ^(b)	10%	
Scope and Bid Design Contingency ^(c)	20%	(10% design + 10% bid)
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Adjusted conversion ^(d)	58.4%	

(a) General conditions includes cost associated with permits, licenses, insurance, bonds, environmental safe guards, sediment and drainage control, and special construction practices to maintain continued plant operations.

(b) Contractor's overhead and profit include costs for mobilization/demobilization, administration, and contractor/subcontractor overhead costs and profits.

(c) A 20 percent design contingency was used for this estimate based on the conceptual nature of the information developed for this analysis.

(d) The adjusted conversion value is a function of the application of the prorates to total project costs per the *Guide to Developing and Documenting Cost Estimates During the Feasibility Study (EPA, 2000)*.

- 11 Engineering Costs Prorates:
of total project raw costs and Construction Prorates*:

Remedial Design	8%
Project Management	5%
Construction Management	6%
<hr/>	
Total	19.0%

* Annual O&M costs for Project Management and Remedial Design included as Item 2.4 as a variance from *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study (EPA, 2000)*; only Construction Management costs incorporated as prorate.

- 12 Addition of lime slaker, slurry mixing tank, and feed pump; also includes electrical, I&C, and installation.
- 13 Sampling costs based on weekly compliance monitoring, including tri-annual QA/QC costs for outside laboratory analysis. For NO ACTION alternative, monitoring is reduced to monthly basis.
- 14 Operational sampling estimated as 150% of compliance monitoring costs to allow for weekly influent monitoring and miscellaneous process analyses.

CDM Camp Dresser & McKee Inc.
Preliminary Opinion of Probable Cost

Project:	<u>Gilt Edge Mine</u>	Updated:	<u>7-Sep-01</u>
Project #:	<u>4000-30291</u>	Estimator:	<u>BCD</u>
Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 1 - No Action

The No Action alternative would discontinue the existing surface water and ARD collection and treatment measures. There would be no change in the aqueous contaminant concentrations because no treatment, containment, or removal of ARD is included in this alternative. For the interim period (approximately 5 years), site security, sampling and report preparation are included.

Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1	CAPITAL COSTS		Total	0	
2	ANNUAL O&M COSTS				
2.1	MONITORING	1	LS	8,000	8,000 General Note 13
2.2	STAFF				
2.2.1	Security	2	annual salary	34,200	68,400 General Note 4
2.3	INDIRECT COSTS				
2.3.1	Radio and Pager Rental	1	LS	2,000	2,000 General Note 4
2.3.2	Vehicles				
2.3.2.1	Pickup Truck	12	months	750	9,000 Means Heavy Construction Cost Data (2001), 01590-400-7200
2.3.2.2	Fuel	1	year	22,000	22,000 Means Heavy Construction Cost Data (2001), 01590-400-7200
2.3.3	Utilities				
2.3.3.1	Water	12	months	100	1,200 General Note 4
2.3.3.2	Phone	12	months	200	2,400 Means Heavy Construction Cost Data (2001), 01520-550-0140
2.3.3.3	Electrical	12	months	200	2,400 Estimated
Annual O&M Costs			Subtotal	116,000	

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
2.4	CONSTRUCTION PRORATES	1	LS	69,000	69,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	24,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	14,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	31,000		
2.5	ENGINEERING COSTS	1	LS	9,000	9,000	see Note A below
	Project Management		5% of Total Cost + Const Prorates	9,000		
ANNUAL O&M COSTS				Total	194,000	
3	PERIODIC COSTS					
3.1	Five-Year Review Reports	1	LS	11,000	11,000	
Periodic Costs				Subtotal	11,000	
3.2	CONSTRUCTION PRORATES	1	LS	9,000	9,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	3,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	2,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	4,000		
3.3	ENGINEERING COSTS	1	LS	1,000	1,000	see Note A below
	Project Management		5% of Total Cost + Const Prorates	1,000		
PERIODIC COSTS				Total	21,000	

Notes

A	<u>Engineering Cost Factor:</u>		
	Costs include the following items applied as a percentage of total project raw costs and Construction Prorates*:		
	Remedial Design		0%
	Project Management		5%
	Construction Management		0%
Total			5%

* Only Project Management costs incorporated as prorate.

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Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 3a - Divert ARD Flow from Hoodoo Gulch to Sunday Pit and Install ARD Diversion Ditch At Pond C

The seepage from Hoodoo Gulch would be collected within a collection (sump) system prior to convergence with Strawberry Creek. Collected water would flow by gravity to a storage tank and subsequently be pumped to Sunday Pit. A HDPE lined interception channel would be constructed to collect seepage upstream of Pond C as surface water run-off. The channel would flow to the south, with discharge to Pond D.

Cumulative seepage flow rate, gpm =		10 gpm				
Transfer flow rate, gpm =		30 gpm				
Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes	
1	CAPITAL COSTS					
1.1	CIVIL/SITEWORK					
1.1.1	Sumps (Hoodoo Gulch)	5 total				
1.1.1.1	Excavation	5	CY	52	1,000	Means Heavy Construction Cost Data (2001), 02240-500-0300
1.1.1.2	Backfill	4	CY	22	1,000	Means Heavy Construction Cost Data (2001), 02315-100-0300
1.1.2	Pond C Collection Ditch					
1.1.2.1	Excavation	500	CY	4.05	3,000	Means Heavy Construction Cost Data (2001), 02315-900-0050
1.1.2.2	Compaction	500	CY	2.71	2,000	Means Heavy Construction Cost Data (2001), 02315-900-1900
1.1.2.3	Trimming	8625	SF	0.42	4,000	Means Heavy Construction Cost Data (2001), 02315-900-2100
1.1.3	Piping (Trenching, Backfill, and Bedding)					
1.1.3.1	Sump Collectors	350	LF	3.57	2,000	Means Heavy Construction Cost Data (2001), 02315-940-0700, -1700, and -130-0200
1.1.3.2	Main Collector	900	LF	3.57	4,000	Means Heavy Construction Cost Data (2001), 02315-940-0700, -1700, and -130-0200
1.1.3.3	Transfer to Sunday Pit	2300	LF	2.05	5,000	Means Heavy Construction Cost Data (2001), 02315-940-2850 and -130-0200
			Subtotal	22,000		
1.2	STRUCTURAL					
1.2.1	Concrete Sump	5	EA	1,054	6,000	Means Heavy Construction Cost Data (2001), 02630-200-0800
1.2.1.1	HDPE Liner for Sump	250	SF	7.67	2,000	based on Means (2001), 02660-400-0200 and \$60/hr at 5hrs per sump
1.2.2	HDPE Lining for Pond C Collection Ditch	10875	SF	1.05	12,000	Means Heavy Construction Cost Data (2001), 02630-400-0200
1.2.3	Concrete Foundation for Storage Tank	3	CY	161	500	Means Heavy Construction Cost Data (2001), 03300-130-4050
			Subtotal	21,000		
1.3	PROCESS/MECHANICAL					
1.3.1	Piping					
1.3.1.1	CPVC - 1" (Sump Collectors)	350	LF	2.45	900	Herco Catalog (1998), p.96 and Means Heavy Construction Data (2001), 02510-840-2100
1.3.1.2	CPVC - 2" (Main Collection Header)	900	LF	4.65	5,000	Herco Catalog (1998), p.96 and Means Heavy Construction Data (2001), 02510-840-2120
1.3.1.3	CPVC - 3" (Transfer to Sunday Pit)	2300	LF	9.10	21,000	Herco Catalog (1998), p.96 and Means Heavy Construction Data (2001), 02510-840-2160
1.3.1.4	Valves and Appurtenances	1	LS	15,600	16,000	General Note 8
1.3.2	Storage Tank	1	LS	10,000	10,000	VQ - General Note 1
1.3.3	Submersible Pump	1	EA	4,500	5,000	VQ - General Note 1
			Subtotal	58,000		

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1.4	ELECTRICAL	1	LS	24,000	24,000	see Note A below
1.5	INSTRUMENTATION and CONTROLS	1	LS	12,000	12,000	see Note A below
Capital Costs				Subtotal	137,000	
1.6	CONSTRUCTION PRORATES	1	LS	82,000	82,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	28,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	17,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	37,000		
1.7	ENGINEERING COSTS	1	LS	43,000	43,000	General Note 11
	Remedial Design		8% of Total Cost + Const Prorates	18,000		
	Project Management		5% of Total Cost + Const Prorates	11,000		
	Construction Management		6% of Total Cost + Const Prorates	14,000		
CAPITAL COSTS				Total	262,000	
2	ANNUAL O&M COSTS					
2.1	ARD Transfer rom Hoodoo Gulch Seepage Storage Tank to Sunday Pit (at 8 hrs/day)	5	HP	429/(HP*yr)	1,000	General Note 5
Annual O&M Costs				Subtotal	1,000	
2.2	CONSTRUCTION PRORATES	1	LS	700	700	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	200		
	Contractor's Profit ^(b)		10% of Total Cost + GC	200		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	300		
2.3	ENGINEERING COSTS	1	LS	200	200	see Note B below
	Construction Management		6% of Total Cost + Const Prorates	200		
ANNUAL O&M COSTS				Total	1,900	

Notes				
A	Capital costs for the following items are estimated as a percentage of total Process/Mechanical costs and based on remote location of construction from known electrical sources:			
	Electrical	40%	(Means(2001);based on trenching, conduit, and backfill)	
	Instrumentation and Controls	20%		
B	Technical Services (i.e., Remedial Design, Project Management) not included in this alternative's analysis; accounted for in Alternative 6.			

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Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 3b - Divert ARD Flow from Hoodoo Gulch to Strawberry Pond and Install ARD Diversion Ditch At Pond C

The seepage from Hoodoo Gulch would be collected within a collection (sump) system prior to convergence with Strawberry Creek. Collected water would gravity-fed to a storage tank and subsequently pumped to Sunday Pit. A HDPE lined interception channel would be constructed to collect seepage upstream of Pond C as surface water run-off. The channel would flow to the south, with discharge to Pond D.

		Cumulative seepage flow rate, gpm =		10 gpm	
		Transfer flow rate, gpm =		30 gpm	
Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1 CAPITAL COSTS					
1.1 CIVIL/SITEWORK					
1.1.1 Sumps	5 total				
1.1.1.1 Excavation	5	CY	52	1,000	Means Heavy Construction Cost Data (2001), 02240-500-0300
1.1.1.2 Backfill	4	CY	22	1,000	Means Heavy Construction Cost Data (2001), 02315-100-0300
1.1.2 Pond C Collection Ditch					
1.1.2.1 Excavation	500	CY	4.05	3,000	Means Heavy Construction Cost Data (2001), 02315-900-0050
1.1.2.2 Compaction	500	CY	2.71	2,000	Means Heavy Construction Cost Data (2001), 02315-900-1900
1.1.2.3 Trimming	8625	SF	0.42	4,000	Means Heavy Construction Cost Data (2001), 02315-900-2100
1.1.3 Piping (Trenching, Backfill, and Bedding)					
1.1.3.1 Sump Collectors	350	LF	3.57	2,000	Means Heavy Construction Cost Data (2001), 02315-940-0700, -1700, and -130-0200
1.1.3.2 Main Collector	900	LF	3.57	4,000	Means Heavy Construction Cost Data (2001), 02315-940-0700, -1700, and -130-0200
1.1.3.3 Transfer to Sunday Pit	3250	LF	2.05	7,000	Means Heavy Construction Cost Data (2001), 02315-940-2850 and -130-0200
			<i>Subtotal</i>	<i>24,000</i>	
1.2 STRUCTURAL					
1.2.1 Concrete Sump	5	EA	1,054	6,000	Means Heavy Construction Cost Data (2001), 02630-200-0800
1.2.1.1 HDPE Liner for Sump	250	SF	7.67	2,000	based on Means (2001), 02660-400-0200 and \$60/hr at 5hrs per sump
1.2.2 HDPE Lining for Pond C Collection Ditch	10875	SF	1.05	12,000	Means Heavy Construction Cost Data (2001), 02630-400-0200
1.2.3 Concrete Foundation for Storage Tank	3	CY	161	500	Means Heavy Construction Cost Data (2001), 03300-130-4050
			<i>Subtotal</i>	<i>21,000</i>	
1.3 PROCESS/MECHANICAL					
1.3.1 Piping					
1.3.1.1 CPVC - 1" (Sump Discharge)	350	LF	2.45	900	Herco Catalog (1998), p.96 and Means Heavy Construction Data (2001), 02510-840-2100
1.3.1.2 CPVC - 2" (Main Collection Header)	900	LF	4.65	5,000	Herco Catalog (1998), p.96 and Means Heavy Construction Data (2001), 02510-840-2120
1.3.1.3 CPVC - 3" (Transfer to Sunday Pit)	3250	LF	9.10	30,000	Herco Catalog (1998), p.96 and Means Heavy Construction Data (2001), 02510-840-2160
1.3.1.4 Valves and Appurtenances	1	LS	21,000	21,000	General Note 8
1.3.2 Storage Tank	1	LS	10,000	10,000	VQ - General Note 1
1.3.3 Submersible Pump	1	EA	4,500	5,000	VQ - General Note 1
			<i>Subtotal</i>	<i>72,000</i>	

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1.4	ELECTRICAL	1	LS	29,000	29,000	see Note A below
1.5	INSTRUMENTATION and CONTROLS	1	LS	15,000	15,000	see Note A below
Capital Costs				Subtotal	161,000	
1.6	CONSTRUCTION PRORATES	1	LS	96,000	96,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	33,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	20,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	43,000		
1.7	ENGINEERING COSTS	1	LS	50,000	50,000	General Note 11
	Remedial Design		8% of Total Cost + Const Prorates	21,000		
	Project Management		5% of Total Cost + Const Prorates	13,000		
	Construction Management		6% of Total Cost + Const Prorates	16,000		
CAPITAL COSTS				Total	307,000	
2 ANNUAL O&M COSTS						
2.1	ARD Transfer rom Hoodoo Gulch Seepage Storage Tank to Strawberry Pond (at 8 hrs/day)	5	HP	429/(HP*yr)	1,000	General Note 5
Annual O&M Costs				Subtotal	1,000	
2.2	CONSTRUCTION PRORATES	1	LS	700	700	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	200		
	Contractor's Profit ^(b)		10% of Total Cost + GC	200		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	300		
2.3	ENGINEERING COSTS	1	LS	200	200	see Note B below
	Construction Management		6% of Total Cost + Const Prorates	200		
ANNUAL O&M COSTS				Total	1,900	

Notes

- A Capital costs for the following items are estimated as a percentage of total Process/Mechanical costs and based on remote location of construction from known electrical sources:
- | | | |
|------------------------------|-----|---|
| Electrical | 40% | (Means(2001);based on trenching, conduit, and backfill) |
| Instrumentation and Controls | 20% | |
- B Technical Services (i.e., Remedial Design, Project Management) not included in this alternative's analysis; accounted for in Alternative 6.

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Project:	<u>Gilt Edge Mine</u>	Updated:	<u>7-Sep-01</u>
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Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 6a - Upgrade Existing Caustic Chemical Precipitation ARD WTP With Additional Treatment Train and Filtration (ARAR waiver)

This alternative would consist of upgrades to the existing caustic-addition ARD treatment plant. Sludge residuals are disposed of at an on-site location (e.g., dewatered, lined ponds). Optimized operations include a polishing filter; sludge residual treatment using a filter press; and annual O&M operations for the treatment plant including utilities, staff, administration, site snow removal, and weekly monitoring sampling and support.

		Existing Treatment Capacity, gpm =	300 gpm			
		New Treatment Capacity, gpm =	0 gpm			
		Total Treatment Capacity, gpm =	300 gpm			
Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1	CAPITAL COSTS					
1.1	CIVIL/SITEWORK					
1.1.1	Excavation	243	CY	10	3,000	PW - General Note 1
1.1.2	Fine Grading	243	SY	0.85	300	Means Heavy Construction Cost Data (2001), 02305-440-1100
1.1.3	Structural Fill below SOG	81	CY	20	2,000	PW - General Note 1
1.1.4	Aggregate below SOG	81	CY	19	2,000	Means Heavy Construction Cost Data (2001), 02315-505-1100
1.1.5	Disposal (non-contaminated materials)	1	LS	1,000	1,000	Means Heavy Construction Cost Data (2001), 02220-875-5550
				<i>Subtotal</i>	<i>8,300</i>	
1.2	STRUCTURAL					
1.2.1	Pre-Fabricated Steel Building w/Insulated Walls	2000	SF	10	20,000	Means Cost Data (2001), 13128-700-1100, x-6900
1.2.2	Concrete, Building/Clarifier/Sludge Storage Foundations	170	CY	250	43,000	Means Cost Data (2001), 03310-240-4050
				<i>Subtotal</i>	<i>63,000</i>	
1.3	PROCESS/MECHANICAL					
1.3.1	Headworks Pump	0	EA	0	0	VQ - General Note 1
1.3.2	Sludge Mix Tank	0	LS	0	0	VQ - General Note 1
1.3.2.1	Mixer	0	LS	0	0	VQ - General Note 1
1.3.3	Sodium Hydroxide Storage Tank	0	LS	0	0	VQ - General Note 1
1.3.3.1	Metering Pump	0	LS	0	0	Means (2000), Env. Cost Data, 33-32-0122
1.3.4	Sodium Hydroxide Rapid Mix Tank	0	LS	0	0	VQ - General Note 1
1.3.4.1	Mixer	0	LS	0	0	VQ - General Note 1
1.3.5	Polymer Storage Tank	0	LS	0	0	VQ - General Note 1
1.3.5.1	Polymer Activation/Feed System	0	LS	0	0	VQ - General Note 1
1.3.6	Flocculation Tank	0	LS	0	0	VQ - General Note 1
1.3.6.1	Mixer	0	LS	0	0	VQ - General Note 1
1.3.7	Circular Clarifier	1	EA	184,000	184,000	VQ - General Note 1

Item		Quantity	Unit	Unit Bare Cost (S)	Total Bare Cost (nearest \$100)	Notes
1.3.7.1	Sludge Recycle Pump	1	EA	16,875	17,000	VQ - General Note 1
1.3.7.2	Sludge-to-Waste Pump	2	EA	16,875	34,000	VQ - General Note 1
1.3.7.3	Post Clarifier Acid Addition					
1.3.7.3.1	Acid Storage Tank	1	EA	14,000	14,000	VQ - General Note 1
1.3.7.3.2	Metering Pump	1	EA	5,600	6,000	Means (2000), Env. Cost Data, 33-32-0122
1.3.7.3.3	Rapid Mix Tank	1	EA	4,500	5,000	VQ - General Note 1
1.3.7.3.4	Mixer	1	EA	2,500	3,000	VQ - General Note 1
1.3.8	Disc Filter	1	LS	108,750	109,000	VQ - General Note 1
1.3.9	Settled Water Storage Tank	1	LS	11,500	12,000	VQ - General Note 1
1.3.10	Sludge Conditioning/Handling Equipment					
1.3.10.1	Sludge Storage Tank	1	LS	21,500	22,000	VQ - General Note 1
1.3.10.2	Sludge Transfer Pump to Filter Press	1	EA	16,875	17,000	VQ - General Note 1
1.3.10.3	Polymer Storage Tank	1	EA	3,750	4,000	VQ - General Note 1
1.3.10.4	Polymer Activation/Feed System	1	LS	6,500	7,000	VQ - General Note 1
1.3.10.5	Filter Press	1	EA	175,000	175,000	VQ - General Note 1
1.3.10.6	Filtrate Return Pump	1	EA	16,875	17,000	VQ - General Note 1
1.3.11	Piping					
1.3.11.1	PVC - 1"	80	LF	9	800	Means Heavy Construction Cost Data (2001), 15108-520-4410
1.3.11.2	PVC - 2"	0	LF	11	0	Means Heavy Construction Cost Data (2001), 15108-520-4460
1.3.11.3	PVC - 4"	300	LF	15	5,000	Means Heavy Construction Cost Data (2001), 15108-520-4480
1.3.11.4	PVC - 6"	0	LF	21	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.11.5	PVC - 8"	100	LF	33	4,000	Means Heavy Construction Cost Data (2001), 15108-520-4500
1.3.11.6	PVC - 12"	0	LF	66	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.11.7	HDPE - 2"	0	LF	15	0	General Note 9
1.3.11.8	HDPE - 4"	0	LF	23	0	General Note 9
1.3.11.9	HDPE - 8"	200	LF	32	7,000	General Note 9
1.3.11.10	Valves and Appurtenances	1	LS	11,000	11,000	General Note 8
				<i>Subtotal</i>	<i>654,000</i>	
1.4	ELECTRICAL	1	LS	75,200	75,200	General Note 6
1.5	INSTRUMENTATION and CONTROLS	1	LS	93,900	93,900	General Note 6
Capital Costs				Subtotal	895,000	

			Unit Bare Cost	Total Bare Cost		
Item		Quantity	Unit	(\$)	(nearest \$100) Notes	
1.6	CONSTRUCTION PRORATES	1	LS	524,000	524,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	179,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	108,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	237,000		
1.7	ENGINEERING COSTS	1	LS	271,000	271,000	General Note 11
	Remedial Design		8% of Total Cost + Const Prorates	114,000		
	Project Management		5% of Total Cost + Const Prorates	71,000		
	Construction Management		6% of Total Cost + Const Prorates	86,000		
CAPITAL COSTS				Total	1,690,000	
2	ANNUAL O&M COSTS					
2.1	CHEMICALS					
2.1.1	Hydroxide (Caustic)	300	gpm	2713	814,000	VQ - General Note 1
2.1.2	Polymer	300	gpm	174	53,000	VQ - General Note 1
2.1.3	Acid	300	gpm	17	6,000	VQ - General Note 1
				Subtotal	873,000	
2.2	SLUDGE DISPOSAL		see General Note 2			
2.3	MONITORING/SAMPLING					
2.3.1	Compliance Monitoring	1	LS	27,000	27,000	General Note 13
2.3.2	Operational Monitoring	1	LS	41,000	41,000	General Note 14
				Subtotal	68,000	
2.4	STAFF					
2.4.1	Plant Engineer	1	annual salary	82,500	83,000	General Note 4
2.4.2	Operators	8	annual salary	38,100	305,000	General Note 4
2.4.3	Mechanic	2	annual salary	59,800	120,000	General Note 4
2.4.4	Chemist	1	annual salary	39,600	40,000	General Note 4
2.4.5	Security	2	annual salary	34,200	69,000	General Note 4
2.4.6	Administrative Assistant	1	annual salary	25,000	25,000	General Note 4
				Subtotal	642,000	
2.5	OTHER DIRECT COSTS					
2.5.1	Project Manager	1040	hours per year	40	42,000	General Note 4
2.5.2	Junior Engineer	240	hours per year	30	8,000	General Note 4
2.5.3	Project Engineer	240	hours per year	50	13,000	General Note 4
				Subtotal	63,000	

			Unit Bare Cost	Total Bare Cost		
Item		Quantity	Unit	(\$)	(nearest \$100) Notes	
2.6	INDIRECT COSTS					
2.6.1	Radio and Pager Rental	1	LS	2,000	2,000	General Note 4
2.6.2	Vehicles					
2.6.2.1	Dozer	12	months	4,325	52,000	Means Heavy Construction Cost Data (2001), 01590-200-4150
2.6.2.2	Front Loader	12	months	6,000	72,000	Means Heavy Construction Cost Data (2001), 01590-200-4730
2.6.2.3	Suburban	12	months	900	11,000	Means Heavy Construction Cost Data (2001), 01590-400-7250
2.6.2.4	Pickup Truck	12	months	2,250	27,000	Means Heavy Construction Cost Data (2001), 01590-400-7200
2.6.2.5	Fuel	1	year	138,000	138,000	based on hourly costs for above Items, 8 hrs/365 days
2.6.3	Road Grading	4	per year	5,000	20,000	General Note 4
2.6.4	Temporaty Lab	12	months	350	5,000	Means Heavy Construction Cost Data (2001), 01520-500-0550
2.6.5	Supplies	1	LS	132,000	132,000	General Note 4
2.6.6	Utilities					
2.6.6.1	Water	1	LS	5,000	5,000	General Note 4
2.6.6.2	Phone	12	months	500	6,000	Means Heavy Construction Cost Data (2001), 01520-550-0140
2.6.6.3	Electrical					
2.6.6.3.1	Pumps					
2.6.6.3.1.1	Ruby Gulch to Sunday Pit	150	HP	429/(HP*yr)	22,000	General Note 5; 8 hours per day average over year
2.6.6.3.1.2	Pond E to (E) WTP	150	HP	429/(HP*yr)	65,000	General Note 5; 24 hours/day, 365 days/year
2.6.6.3.1.3	Heap Leach Recirculating (On-Solution)	150	HP	429/(HP*yr)	38,000	General Note 5; October through April, 24 hours/day
2.6.6.3.1.4	Heap Leach Recirculating (concurrently w/2.5.6.3.1.3)	15	HP	429/(HP*yr)	4,000	General Note 5; October through April, 24 hours/day
2.6.6.3.1.5	Sludge Recycle	15	HP	429/(HP*yr)	7,000	General Note 5
2.6.6.3.1.6	Sludge-to-Waste	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.1.7	Sludge Storage to Filter Press	10	HP	429/(HP*yr)	5,000	General Note 5
2.6.6.3.1.8	Filtrate Pump	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.2	Chemical Feed Systems					
2.6.6.3.2.1	Sodium Hydroxide Feed	2	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.2.2	Polymer Activation/Feed System	1.5	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.2.3	Sludge Polymer Activation/Feed System	1.5	HP	429/(HP*yr)	700	General Note 5
2.6.6.3.3	Mixers					
2.6.6.3.3.1	Sludge Mixing Tank	2	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.3.2	Sodium Hydroxide Rapid Mix	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.3.3	Flocculation	2	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.3.4	Sludge Storage Tank	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.3.5	Clarifier Rake	2	HP	429/(HP*yr)	900	General Note 5
2.6.6.3.4	Sludge Handling Equipment					
2.6.6.3.4.1	Filter Press	7	HP	429/(HP*yr)	4,000	General Note 5
2.6.6.4	Fuel for Pumps/Heaters (diesel and propane)	12	months	10,080	121,000	Based on actual site usage + 20% adjustment for new WTP building
				Subtotal	754,000	
Annual O&M Costs				Subtotal	2,400,000	

Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
2.7	CONSTRUCTION PRORATES	1	LS	1,402,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	480,000	
	Contractor's Profit ^(b)		10% of Total Cost + GC	288,000	
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	634,000	
2.8	ENGINEERING COSTS	1	LS	228,000	General Note 11
	Construction Management		6% of Total Cost + Const Prorates	228,000	
ANNUAL O&M COSTS			Total	4,030,000	
			per month	\$335,833	
			per 1,000 gallons	\$25.56	

Preliminary Opinion of Probable Cost

Project:	<u>Gilt Edge Mine</u>	Updated:	<u>7-Sep-01</u>
Project #:	<u>4000-30291</u>	Estimator:	<u>BCD</u>
Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 6b - Convert Existing Caustic Chemical Precipitation ARD WTP to Lime Precipitation and upgrade With Additional Treatment Train and Filtration (ARAR waiver)

This alternative would consist of conversion of the existing caustic-addition treatment process to a lime-addition precipitation treatment process. Sludge residuals are disposed of at an on-site location (e.g., dewatered, lined ponds). Optimized operations include addition of a lime slaking system; polishing filter; sludge residual treatment using a filter press; and annual O&M operations for the treatment plant including utilities, staff, administration, site snow removal, and weekly monitoring sampling and support.

		Existing Treatment Capacity, gpm =	300 gpm			
		New Treatment Capacity, gpm =	0 gpm			
		Total Treatment Capacity, gpm =	300 gpm			
Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1	CAPITAL COSTS					
1.1	CIVIL/SITEWORK					
1.1.1	Excavation	243	CY	10	3,000	PW - General Note 1
1.1.2	Fine Grading	243	SY	0.85	300	Means Heavy Construction Cost Data (2001), 02305-440-1100
1.1.3	Structural Fill below SOG	81	CY	20	2,000	PW - General Note 1
1.1.4	Aggregate below SOG	81	CY	19	2,000	Means Heavy Construction Cost Data (2001), 02315-505-1100
1.1.5	Disposal (non-contaminated materials)	1	LS	1,000	1,000	Means Heavy Construction Cost Data (2001), 02220-875-5550
				<i>Subtotal</i>	<i>8,300</i>	
1.2	STRUCTURAL					
1.2.1	Pre-Fabricated Steel Building	2000	SF	10	20,000	Means Cost Data (2001), 13128-700-1100, x-6900
1.2.2	Concrete, Building/Clarifier/Sludge Storage Foundations	182	CY	250	46,000	Means Cost Data (2001), 03310-240-4050
				<i>Subtotal</i>	<i>66,000</i>	
1.3	PROCESS/MECHANICAL					
1.3.1	Headworks Pump	0	EA	0	0	VQ - General Note 1
1.3.2	Sludge Mixing Tank	0	LS	0	0	VQ - General Note 1
1.3.2.1	Mixer	0	LS	0	0	VQ - General Note 1
1.3.3	Rapid Mix Tank	0	LS	0	0	VQ - General Note 1
1.3.3.1	Mixer	0	LS	0	0	VQ - General Note 1
1.3.4	Polymer Storage Tank	0	LS	0	0	VQ - General Note 1
1.3.4.1	Polymer Activation/Feed System	0	LS	0	0	VQ - General Note 1
1.3.5	Flocculation Tank	0	LS	0	0	VQ - General Note 1
1.3.5.1	Mixer	0	LS	0	0	VQ - General Note 1
1.3.6	Circular Clarifier	1	EA	184,000	184,000	VQ - General Note 1
1.3.6.1	Sludge Recycle Pump	1	EA	16,875	17,000	VQ - General Note 1
1.3.6.2	Sludge-to-Waste Pump	2	EA	16,875	34,000	VQ - General Note 1

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1.3.6.3	Post Clarifier Acid Addition					
1.3.6.3.1	Acid Storage Tank	1	EA	14,000	14,000	VQ - General Note 1
1.3.6.3.2	Metering Pump	1	EA	5,600	6,000	Means (2000), Env. Cost Data, 33-32-0122
1.3.6.3.3	Rapid Mix Tank	1	EA	4,500	5,000	VQ - General Note 1
1.3.6.3.4	Mixer	1	EA	2,500	3,000	VQ - General Note 1
1.3.7	Disc Filter	1	LS	108,750	109,000	VQ - General Note 1
1.3.8	Settled Water Storage Tank	1	LS	10,000	10,000	VQ - General Note 1
1.3.9	Sludge Conditioning/Handling Equipment					
1.3.9.1	Sludge Storage Tank	1	LS	47,921	48,000	VQ - General Note 1
1.3.9.2	Sludge Transfer Pump to Filter Press	1	EA	16,875	17,000	VQ - General Note 1
1.3.9.3	Polymer Storage Tank	1	EA	3,750	4,000	VQ - General Note 1
1.3.9.4	Polymer Activation/Feed System	1	LS	6,500	7,000	VQ - General Note 1
1.3.9.5	Filter Press	1	EA	225,000	225,000	VQ - General Note 1
1.3.9.6	Filtrate Return Pump	1	EA	16,875	17,000	VQ - General Note 1
1.3.10	Piping					
1.3.10.1	PVC - 1"	80	LF	9	800	Means Heavy Construction Cost Data (2001), 15108-520-4410
1.3.10.2	PVC - 2"	0	LF	11	0	Means Heavy Construction Cost Data (2001), 15108-520-4460
1.3.10.3	PVC - 4"	300	LF	15	5,000	Means Heavy Construction Cost Data (2001), 15108-520-4480
1.3.10.4	PVC - 6"	0	LF	21	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.10.5	PVC - 8"	100	LF	33	4,000	Means Heavy Construction Cost Data (2001), 15108-520-4500
1.3.10.6	PVC - 12"	0	LF	66	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.10.7	HDPE - 2"	0	LF	15	0	General Note 9
1.3.10.8	HDPE - 4"	0	LF	23	0	General Note 9
1.3.10.9	HDPE - 8"	200	LF	32	7,000	General Note 9
1.3.10.10	Valves and Appurtenances	1	LS	11,000	11,000	General Note 8
				<i>Subtotal</i>	<i>727,800</i>	
1.4	EXISTING WTP CONVERSION	1	LS	331,000	331,000	General Note 12
1.4.1	Lime Slaker, Slurry Mixing Tank, and Feed Pump	1	LS	260,000		VQ - General Note 1
1.4.2	Electrical	1	LS	32,000		General Note 6
1.4.3	Instrumentation and Controls	1	LS	39,000		General Note 6
1.5	ELECTRICAL	1	LS	84,000	84,000	General Note 6
1.6	INSTRUMENTATION and CONTROLS	1	LS	105,000	105,000	General Note 6
Capital Costs				Subtotal	1,323,000	
1.7	CONSTRUCTION PRORATES	1	LS	774,000	774,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	265,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	159,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	350,000		

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1.8	ENGINEERING COSTS	1	LS	399,000	399,000	General Note 11
	Remedial Design	8% of Total Cost + Const Prorates		168,000		
	Project Management	5% of Total Cost + Const Prorates		105,000		
	Construction Management	6% of Total Cost + Const Prorates		126,000		
CAPITAL COSTS				Total	2,496,000	
2	ANNUAL O&M COSTS					
2.1	CHEMICALS					
2.1.1	Hydrated lime	300	gpm	542	163,000	VQ - General Note 1
2.1.2	Polymer	300	gpm	174	53,000	VQ - General Note 1
2.1.3	Acid	300	gpm	13	4,000	VQ - General Note 1
				Subtotal	220,000	
2.2	SLUDGE DISPOSAL		see General Note 2			
2.3	MONITORING/SAMPLING					
2.3.1	Compliance Monitoring	1	LS	27,000	27,000	General Note 13
2.3.2	Operational Monitoring	1	LS	41,000	41,000	General Note 14
				Subtotal	68,000	
2.4	STAFF					
2.4.1	Plant Engineer	1	annual salary	82,500	83,000	General Note 4
2.4.2	Operators	9	annual salary	38,100	343,000	General Note 4
2.4.3	Mechanic	2	annual salary	59,800	120,000	General Note 4
2.4.4	Chemist	1	annual salary	39,600	40,000	General Note 4
2.4.5	Security	2	annual salary	34,200	69,000	General Note 4
2.4.6	Administrative Assistant	1	annual salary	25,000	25,000	General Note 4
				Subtotal	680,000	
2.5	OTHER DIRECT COSTS					
2.5.1	Project Manager	1040	hours per year	40	42,000	General Note 4
2.5.2	Junior Engineer	240	hours per year	30	8,000	General Note 4
2.5.3	Project Engineer	240	hours per year	50	13,000	General Note 4
				Subtotal	63,000	
2.6	INDIRECT COSTS					
2.6.1	Radio and Pager Rental	1	LS	2,000	2,000	General Note 4

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
2.6.2	Vehicles					
2.6.2.1	Dozer	12	months	4,325	52,000	Means Heavy Construction Cost Data (2001), 01590-200-4150
2.6.2.2	Front Loader	12	months	6,000	72,000	Means Heavy Construction Cost Data (2001), 01590-200-4730
2.6.2.3	Suburban	12	months	900	11,000	Means Heavy Construction Cost Data (2001), 01590-400-7250
2.6.2.4	Pickup Truck (3 total)	12	months	2,250	27,000	Means Heavy Construction Cost Data (2001), 01590-400-7200
2.6.2.5	Fuel	1	year	138,000	138,000	based on hourly costs for above Items, 8 hrs/365 days
2.6.3	Road Grading	4	per year	5,000	20,000	General Note 4
2.6.4	Temporaty Lab	12	months	350	5,000	Means Heavy Construction Cost Data (2001), 01520-500-0550
2.6.5	Supplies	1	LS	132,000	132,000	General Note 4
2.6.6	Utilities					
2.6.6.1	Water	1	LS	5,000	5,000	General Note 4
2.6.6.2	Phone	12	months	500	6,000	Means Heavy Construction Cost Data (2001), 01520-550-0140
2.6.6.3	Electrical					
2.6.6.3.1	Pumps					
2.6.6.3.1.1	Ruby Gulch to Sunday Pit	150	HP	429/(HP*yr)	22,000	General Note 5; 8 hours per day average over year
2.6.6.3.1.2	Pond E to (E) WTP	150	HP	429/(HP*yr)	65,000	General Note 5; 24 hours/day, 365 days/year
2.6.6.3.1.3	Heap Leach Recirculating (On-Solution)	150	HP	429/(HP*yr)	38,000	General Note 5; October through April, 24 hours/day
2.6.6.3.1.4	Heap Leach Recirculating (concurrently w/2.5.6.3.1.3)	15	HP	429/(HP*yr)	4,000	General Note 5; October through April, 24 hours/day
2.6.6.3.1.5	Sludge Recycle	15	HP	429/(HP*yr)	7,000	General Note 5
2.6.6.3.1.6	Sludge-to-Waste	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.1.7	Sludge Storage to Filter Press	10	HP	429/(HP*yr)	5,000	General Note 5
2.6.6.3.1.8	Filtrate Return Pump	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.2	Chemical Feed Systems					
2.6.6.3.2.1	Lime Slaker System	2.5	HP	429/(HP*yr)	2,000	General Note 5
2.6.6.3.2.2	Polymer Activation/Feed System	1.5	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.2.3	Sludge Polymer Activation/Feed System	1.5	HP	429/(HP*yr)	700	General Note 5
2.6.6.3.3	Mixers					
2.6.6.3.3.1	Sludge Mixing Tank	2	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.3.2	Rapid Mix	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.3.3	Flocculation	2	HP	429/(HP*yr)	1,000	General Note 5
2.6.6.3.3.4	Sludge Storage Tank	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.3.3.5	Clarifier Rake	2	HP	429/(HP*yr)	900	General Note 5
2.6.6.3.4	Sludge Handling Equipment					
2.6.6.3.4.1	Filter Press	7	HP	429/(HP*yr)	4,000	General Note 5
2.6.6.4	Fuel for Pumps/Heaters (diesel and propane)	12	months	10,080	121,000	Based on actual site usage + 20% adjustment for new WTP building
				<i>Subtotal</i>	<i>755,000</i>	
Annual O&M Costs				Subtotal	1,786,000	
2.7	CONSTRUCTION PRORATES	1	LS	1,045,000	1,045,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	358,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	215,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	472,000		

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
2.8	ENGINEERING COSTS	1	LS	170,000	170,000	General Note 11
	Construction Management	6% of Total Cost + Const Prorates		170,000		
ANNUAL O&M COSTS				Total	3,001,000	
				per month	\$250,083	
				per 1,000 gallons	\$19.03	

CDM Camp Dresser & McKee Inc.
Preliminary Opinion of Probable Cost

Project:	<u>Gilt Edge Mine</u>	Updated:	<u>7-Sep-01</u>
Project #:	<u>4000-30291</u>	Estimator:	<u>BCD</u>
Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 6c - Construct New Proprietary Microencapsulation/Precipitation ARD WTP (ARAR Waiver)

This alternative would consist of the construction of a new ARD treatment plant. The treatment process would utilize a proprietary chemical silica reagent to encapsulate metal hydroxides. The metal precipitates would be settled out within sedimentation basins. Sludge residuals would be disposed at an onsite location. The process train includes the chemical feed system; mix tanks; sedimentation basins; sludge tanks; and all pumps, instrumentation and appurtenances. Also included are annual O&M operations for the treatment plant including utilities, staff, administration, site snow removal, and weekly monitoring sampling and support.

Treatment Capacity, gpm = **300 gpm**

Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1 CAPITAL COSTS					
1.1 CIVIL/SITEWORK					
1.1.1 Excavation	747	CY	10	8,000	PW - General Note 1
1.1.2 Fine Grading	747	SY	1	800	Means Heavy Construction Cost Data (2001), 02305-440-1100
1.1.3 Structural Fill below SOG	249	CY	20	5,000	PW - General Note 1
1.1.4 Aggregate below SOG	249	CY	19	5,000	Means Heavy Construction Cost Data (2001), 02315-505-1100
1.1.5 Disposal (non-contaminated materials)	1	LS	2,000	2,000	Means Heavy Construction Cost Data (2001), 02220-875-5550
			<i>Subtotal</i>	<i>20,800</i>	
1.2 STRUCTURAL					
1.2.1 Pre-Fabricated Steel Building	6400	SF	9	58,000	Means Cost Data (2001), 13128-700-1100, x-6900
1.2.2 Concrete, Building and Tank Foundations	374	CY	250	94,000	Means Cost Data (2001), 03310-240-4050
			<i>Subtotal</i>	<i>152,000</i>	
1.3 PROCESS/MECHANICAL					
1.3.1 Headworks Pump	1	EA	44,000	44,000	VQ - General Note 1
1.3.2 Micro Encapsulation Process Train, including: metering equipment chemical storage chemical feed sludge pumps/storage tanks/handling piping instrumentation & controls	1	LS	750,000	750,000	VQ - General Note 1
1.3.3 Settled Water Storage Tank	1	LS	21,500	22,000	VQ - General Note 1

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1.3.4	Piping					
1.3.4.1	PVC - 1"	0	LF	9	0	Means Heavy Construction Cost Data (2001), 15108-520-4410
1.3.4.2	PVC - 2"	0	LF	11	0	Means Heavy Construction Cost Data (2001), 15108-520-4460
1.3.4.3	PVC - 4"	100	LF	15	2,000	Means Heavy Construction Cost Data (2001), 15108-520-4480
1.3.4.4	PVC - 6"	0	LF	21	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.4.5	PVC - 8"	40	LF	33	2,000	Means Heavy Construction Cost Data (2001), 15108-520-4500
1.3.4.6	PVC - 12"	0	LF	66	0	Estimated from Means (2001), 15108-520-4490
1.3.4.7	HDPE - 2"	0	LF	15	0	General Note 9
1.3.4.8	HDPE - 4"	0	LF	23	0	General Note 9
1.3.4.9	HDPE - 8"	600	LF	32	20,000	General Note 9
1.3.4.10	Valves and Appurtenances	1	LS	15,000	15,000	General Note 8
				<i>Subtotal</i>	<i>855,000</i>	
1.5	ELECTRICAL	1	LS	98,000	98,000	General Note 6
1.6	INSTRUMENTATION and CONTROLS	1	LS	10,000	10,000	General Note 6
Capital Costs				Subtotal	1,136,000	
1.7	CONSTRUCTION PRORATES	1	LS	666,000	666,000	General Note 10
General Conditions (Overhead) ^(a)			20% of Total Cost	228,000		
Contractor's Profit ^(b)			10% of Total Cost + GC	137,000		
Scope and Bid Design Contingency ^(c)			20% of Total Cost + GC + Profit	301,000		
1.8	ENGINEERING COSTS	1	LS	183,000	183,000	General Note 11
Remedial Design			8% of Total Cost + Const Prorates	77,000		
Project Management			5% of Total Cost + Const Prorates	48,000		
Construction Management			6% of Total Cost + Const Prorates	58,000		
CAPITAL COSTS				Total	1,985,000	
2	ANNUAL COSTS					
2.1	CHEMICALS					
2.1.1	Chemicals (inc. proprietary)	300 gpm	gpm	2150	645,000	VQ - reagent dose 2800 ppm at \$350/ton
				<i>Subtotal</i>	<i>645,000</i>	
2.2	SLUDGE DISPOSAL	see General Note 2				
2.3	MONITORING/SAMPLING					
2.3.1	Compliance Monitoring	1	LS	27,000	27,000	General Note 13
2.3.2	Operational Monitoring	1	LS	41,000	41,000	General Note 14
				<i>Subtotal</i>	<i>68,000</i>	

Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes	
2.4	STAFF					
2.4.1	Plant Engineer	1	annual salary	82,500	83,000	General Note 4
2.4.2	Operators	8	annual salary	38,100	305,000	General Note 4
2.4.3	Mechanic	2	annual salary	59,800	120,000	General Note 4
2.4.4	Chemist	1	annual salary	39,600	40,000	General Note 4
2.4.5	Security	2	annual salary	34,200	69,000	General Note 4
2.4.6	Administrative Assistant	1	annual salary	25,000	25,000	General Note 4
				Subtotal	642,000	
2.5	OTHER DIRECT COSTS					
2.5.1	Project Manager	1040	hours per year	40	42,000	General Note 4
2.5.2	Junior Engineer	240	hours per year	30	8,000	General Note 4
2.5.3	Project Engineer	240	hours per year	50	13,000	General Note 4
				Subtotal	63,000	
2.6	INDIRECT COSTS					
2.6.1	Radio and Pager Rental	1	LS	2,000	2,000	General Note 4
2.6.2	Vehicles					
2.6.2.1	Dozer	12	months	4,325	52,000	Means Heavy Construction Cost Data (2001), 01590-200-4150
2.6.2.2	Front Loader	12	months	6,000	72,000	Means Heavy Construction Cost Data (2001), 01590-200-4730
2.6.2.3	Suburban	12	months	900	11,000	Means Heavy Construction Cost Data (2001), 01590-400-7250
2.6.2.4	Pickup Truck	12	months	2,250	27,000	Means Heavy Construction Cost Data (2001), 01590-400-7200
2.6.2.5	Fuel	1	year	138,000	138,000	based on hourly costs for above Items, 8 hrs/365 days
2.6.3	Road Grading	4	per year	5,000	20,000	General Note 4
2.6.4	Temporaty Lab	12	months	350	5,000	Means Heavy Construction Cost Data (2001), 01520-500-0550
2.6.5	Supplies	1	LS	131,800	132,000	General Note 4
2.6.6	Utilities					
2.6.6.1	Water	1	LS	5,000	5,000	General Note 4
2.6.6.2	Phone	12	months	500	6,000	Means Heavy Construction Cost Data (2001), 01520-550-0140
2.6.6.3	Electrical					
2.6.6.3.1	Pumps					
2.6.6.3.1.1	Ruby Gulch to Sunday Pit	150	HP	429/(HP*yr)	22,000	General Note 5; 8 hours per day average over year
2.6.6.3.1.2	Pond E to (E) WTP	150	HP	429/(HP*yr)	65,000	General Note 5; 24 hours/day, 365 days/year
2.6.6.3.1.3	Heap Leach Recirculating (On-Solution)	150	HP	429/(HP*yr)	38,000	General Note 5; October through April, 24 hours/day
2.6.6.3.1.4	Heap Leach Recirculating (concurrently w/2.5.6.3.1.3)	15	HP	429/(HP*yr)	4,000	General Note 5; October through April, 24 hours/day
2.6.6.3.2	Microencapsulation Process Train	15	HP	429/(HP*yr)	7,000	General Note 5
2.6.6.4	Fuel for Pumps/Heaters (diesel and propane)	12	months	10,080	121,000	Based on actual site usage + 20% adjustment for new WTP building
				Subtotal	606,000	
Annual O&M Costs			Subtotal	2,024,000		

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
2.7	CONSTRUCTION PRORATES	1	LS	1,183,000	1,183,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	405,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	243,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	535,000		
2.8	ENGINEERING COSTS	1	LS	193,000	193,000	General Note 11
	Construction Management		6% of Total Cost + Const Prorates	193,000		
ANNUAL O&M COSTS				Total	3,332,000	
				per month	\$277,667	
				per 1,000 gallons	\$21.13	

CDM Camp Dresser & McKee Inc.
Preliminary Opinion of Probable Cost

Project:	<u>Gilt Edge Mine</u>	Updated:	<u>7-Sep-01</u>
Project #:	<u>4000-30291</u>	Estimator:	<u>BCD</u>
Location:	<u>Lawrence County, South Dakota</u>	Project Status:	<u>Final ARD WTP FFS (-30% to +50%)</u>

Alternative 6d - Construct New Optimized Chemical Precipitation ARD WTP Using Proprietary Metals Coordination Process and Microfiltration (ARAR Waiver)

This alternative would consist of the construction of a new ARD treatment plant. The treatment process would utilize an optimized precipitation treatment process using proprietary polymer technology to encapsulate metal hydroxides. Chemical reagents would be used to adjust pH during the process prior to addition of polymers. Sedimentation followed by microfiltration membranes would be used to remove the metal precipitates. Sludge residuals are disposed of at an on-site location (e.g., dewatered, lined ponds). The process train also includes the chemical and polymer feed systems; mix tanks; sedimentation tanks; sludge tanks; and all pumps, instrumentation and appurtenances. Also included are annual O&M operations for the treatment plant including utilities, staff, administration, site snow removal, and weekly monitoring sampling and support.

Treatment Capacity, gpm = **300 gpm**

Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1 CAPITAL COSTS					
1.1 CIVIL/SITEWORK					
1.1.1 Excavation	940	CY	10	10,000	PW - General Note 1
1.1.2 Fine Grading	940	SY	1	1,000	Means Heavy Construction Cost Data (2001), 02305-440-1100
1.1.3 Structural Fill below SOG	313	CY	20	7,000	PW - General Note 1
1.1.4 Aggregate below SOG	313	CY	19	7,000	Means Heavy Construction Cost Data (2001), 02315-505-1100
1.1.5 Disposal (non-contaminated materials)	1	LS	2,000	2,000	Means Heavy Construction Cost Data (2001), 02220-875-5550
			<i>Subtotal</i>	<i>27,000</i>	
1.2 STRUCTURAL					
1.2.1 Pre-Fabricated Steel Building	8100	SF	9	73,000	Means Cost Data (2001), 13128-700-1100, x-6900
1.2.2 Concrete, Building and Tank Foundations	313	CY	250	79,000	Means Cost Data (2001), 03310-240-4050
			<i>Subtotal</i>	<i>152,000</i>	
1.3 PROCESS/MECHANICAL					
1.3.1 Headworks Pump	1	EA	44,000	44,000	VQ - General Note 1
1.3.2 Optimized Precipitation process train, including:	1	LS	1,469,000	1,469,000	VQ - General Note 1; see Note A below
pumps					
chemical storage					
chemical feed					
membranes					
piping					
accessories					
filter press					
electrical and I&C					

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
1.3.3	Settled Water Storage Tank	1	EA	21,500	22,000	VQ - General Note 1
1.3.4	Sludge Conditioning/Handling Equipment					
1.3.4.1	Sludge Storage Tank	1	LS	47,921	48,000	VQ - General Note 1
1.3.4.2	Sludge Transfer Pump to Filter Press	1	EA	16,875	17,000	VQ - General Note 1
1.3.5	Piping					
1.3.5.1	PVC - 1"	0	LF	9	0	Means Heavy Construction Cost Data (2001), 15108-520-4410
1.3.5.2	PVC - 2"	0	LF	11	0	Means Heavy Construction Cost Data (2001), 15108-520-4460
1.3.5.3	PVC - 4"	100	LF	15	2,000	Means Heavy Construction Cost Data (2001), 15108-520-4480
1.3.5.4	PVC - 6"	0	LF	21	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.5.5	PVC - 8"	40	LF	33	2,000	Means Heavy Construction Cost Data (2001), 15108-520-4500
1.3.5.6	PVC - 12"	0	LF	66	0	Means Heavy Construction Cost Data (2001), 15108-520-4490
1.3.5.7	HDPE - 2"	0	LF	15	0	General Note 9
1.3.5.8	HDPE - 4"	0	LF	23	0	General Note 9
1.3.5.9	HDPE - 8"	600	LF	32	20,000	General Note 9
1.3.5.10	Valves and Appurtenances	1	LS	15,000	15,000	General Note 8
				<i>Subtotal</i>	<i>1,639,000</i>	
1.4	ELECTRICAL	1	LS	15,800	16,000	General Note 6
1.5	INSTRUMENTATION and CONTROLS	1	LS	19,700	20,000	General Note 6
Capital Costs				Subtotal	1,854,000	
1.6	CONSTRUCTION PRORATES	1	LS	225,000	225,000	General Note 10; see Note A below
	General Conditions (Overhead) ^(a)		20% of Total Cost	77,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	47,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	102,000		
1.7	ENGINEERING COSTS	1	LS	396,000	396,000	General Note 11; see Note A below
	Remedial Design		8% of Total Cost + Const Prorates	167,000		
	Project Management		5% of Total Cost + Const Prorates	104,000		
	Construction Management		6% of Total Cost + Const Prorates	125,000		
CAPITAL COSTS				Total	2,475,000	

Item	Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes	
2	ANNUAL COSTS					
2.1	CHEMICALS					
2.1.1	pH Adjustment	1	LS	65,000	65,000	VQ - General Note 1
2.1.2	Chemicals (inc. proprietary)	1	LS	75,000	75,000	VQ - General Note 1
				Subtotal	140,000	
2.2	SLUDGE DISPOSAL	see General Note 2				
2.3	MONITORING/SAMPLING					
2.3.1	Compliance Monitoring	1	LS	27,000	27,000	General Note 13
2.3.2	Operational Monitoring	1	LS	41,000	41,000	General Note 14
				Subtotal	68,000	
2.4	STAFF					
2.4.1	Plant Engineer	1	annual salary	82,500	83,000	General Note 4
2.4.2	Operators	8	annual salary	38,100	305,000	General Note 4
2.4.3	Mechanic	2	annual salary	59,800	120,000	General Note 4
2.4.4	Chemist	1	annual salary	39,600	40,000	General Note 4
2.4.5	Security	2	annual salary	34,200	69,000	General Note 4
2.4.6	Administrative Assistant	1	annual salary	25,000	25,000	General Note 4
				Subtotal	642,000	
2.5	OTHER DIRECT COSTS					
2.5.1	Project Manager	1040	hours per year	40	42,000	General Note 4
2.5.2	Junior Engineer	240	hours per year	30	8,000	General Note 4
2.5.3	Project Engineer	240	hours per year	50	13,000	General Note 4
				Subtotal	63,000	
2.6	INDIRECT COSTS					
2.6.1	Radio and Pager Rental	1	LS	2,000	2,000	General Note 4
2.6.2	Vehicles					
2.6.2.1	Dozer	12	months	4,325	52,000	Means Heavy Construction Cost Data (2001), 01590-200-4150
2.6.2.2	Front Loader	12	months	6,000	72,000	Means Heavy Construction Cost Data (2001), 01590-200-4730
2.6.2.3	Suburban	12	months	900	11,000	Means Heavy Construction Cost Data (2001), 01590-400-7250
2.6.2.4	Pickup Truck	12	months	2,250	27,000	Means Heavy Construction Cost Data (2001), 01590-400-7200
2.6.2.5	Fuel	1	year	138,000	138,000	based on hourly costs for above Items, 8 hrs/365 days
2.6.3	Road Grading	4	per year	5,000	20,000	General Note 4
2.6.4	Temporaty Lab	12	months	350	5,000	Means Heavy Construction Cost Data (2001), 01520-500-0550
2.6.5	Supplies	1	LS	131,800	132,000	General Note 4
2.6.6	Utilities					
2.6.6.1	Water	1	LS	5,000	5,000	General Note 4
2.6.6.2	Phone	12	months	500	6,000	Means Heavy Construction Cost Data (2001), 01520-550-0140

Item		Quantity	Unit	Unit Bare Cost (\$)	Total Bare Cost (nearest \$100)	Notes
2.6.6.3	Electrical					
2.6.6.3.1	Pumps					
2.6.6.3.1.1	Ruby Gulch to Sunday Pit	150	HP	429/(HP*yr)	22,000	General Note 5; 8 hours per day average over year
2.6.6.3.1.2	Pond E to (E) WTP	150	HP	429/(HP*yr)	65,000	General Note 5; 24 hours/day, 365 days/year
2.6.6.3.1.3	Heap Leach Recirculating (On-Solution)	150	HP	429/(HP*yr)	38,000	General Note 5; October through April, 24 hours/day
2.6.6.3.1.4	Heap Leach Recirculating (concurrently w/2.5.6.3.1.3)	15	HP	429/(HP*yr)	4,000	General Note 5; October through April, 24 hours/day
2.6.6.3.2	General Process Train	132.5	HP	429/(HP*yr)	57,000	General Note 5
2.6.6.3.3	Sludge Handling Equipment					
2.6.6.3.3.1	Filter Press	5	HP	429/(HP*yr)	3,000	General Note 5
2.6.6.4	Fuel for Pumps/Heaters (diesel and propane)	12	months	10,080	121,000	Based on actual site usage + 20% adjustment for new WTP building
				Subtotal	780,000	
Annual O&M Costs				Subtotal	1,693,000	
2.7	CONSTRUCTION PRORATES	1	LS	991,000	991,000	General Note 10
	General Conditions (Overhead) ^(a)		20% of Total Cost	339,000		
	Contractor's Profit ^(b)		10% of Total Cost + GC	204,000		
	Scope and Bid Design Contingency ^(c)		20% of Total Cost + GC + Profit	448,000		
2.8	ENGINEERING COSTS	1	LS	162,000	162,000	General Note 11
	Construction Management		6% of Total Cost + Const Prorates	162,000		
ANNUAL O&M COSTS				Total	2,846,000	
				per month	\$237,167	
				per 1,000 gallons	\$18.05	

Notes

- A Construction Prorates and Engineering Costs are not applied to Item 1.3.2; quoted costs include materials and installation of proprietary process train.